longing to the latter species. *Andrector* is placed in the same sub-tribe as *Cerotoma* and *Diabrotica*, which would rather oppose the idea of a protective mimicry, though by no means disproving it. We simply need more information in regard to the matter as all may be alike inedible.

Since my paper was published, I have found the larvæ of *Diabrotica vittata* so excessively abundant in some greenhouses near Cincinnati, as to entirely ruin the cucumber vines being grown therein. The date of my observations was December 28, and at that time I found adults, and larvæ from one-half to two-thirds grown, but mostly the former.

ON THE PROBABLE ORIGIN OF THE PERICOPIDÆ: COMPOSIA FIDELISSIMA *H.-S.*

By HARRISON G. DYAR, A. M., Ph.D.

The Pericopidæ are a tropical American family of moths with the venation of Noctuidæ, most allied in their colors, perhaps, to the Dioptidæ. Three genera occur in our fauna, *Gnophæla*, *Composia* and *Daritis*.

In placing the North American families in systematic position on their larval characters, I was able to show from the writings of Bruce and Cockerell that the abdominal tubercles of *Gnophæla* were the same as in the Arctiidæ; but was unable to get further in the absence of material and the unfortunate brevity of the published descriptions. Now, however, I have obtained many larvæ of *Composia*, and have been able to rear them by the kind assistance of Mr. F. Kinzel. They were found on the vines of *Echites umbellata* (determined by Mr. Kinzel) at Palm Beach, Florida, during the Christmas holidays. *Composia* is a moderately specialized Pericopid type, and its larvæ may be supposed to be characteristic of the family. The following are the larval characters:

Warts many haired, simple, not tufted, the arrangement as in the Arctiidæ, but with a distinct tendency to the coalescence of the two upper warts on the meso- and post-thoracic segments. Primitive first stage present, wart formation not highly specialized, head setæ very simple, no secondary hair formation. Body long, cylindrical, Noctuidous rather than Arctiiform, joint 12 slightly enlarged.

As to the origin of this family, three alternatives seem possible: (1) from the Arctiidæ (2) from the Noctuidæ (3) from the Dioptidæ.

(1). This alternative seemed to me at first sight most plausible. However, the subcostal vein of secondaries in the Pericopidæ is free from the radius and the wart formation of the larva is of a simple type. Therefore, if of Arctiid origin, they are a branch representing a more generalized type than the present Arctiidæ. But no confirmatory evidence for this possible origin occurs to me.

(2). By pushing the origin a little further back, we reach a derivation from the Noctuidæ. This involves an independent wart formation from that in the Arctiidæ; that is that we may suppose that the Arctiidæ and Pericopidæ arose simultaneously, or nearly so, from Noctuid ancestors, but independently and with separate larval wart formation, the Pericopidæ remaining the more generalized. I do not think of any confirmatory evidence for this view.

(3). The Pericopidæ and Dioptidæ differ in that in the former cubitus is four-branched while three-branched in the latter. This distinction is not sharp, since in *Gonora heliconiata* (a Pericopid) vein 5 arises only a short distance below the fold representing media. In *Dioptis pheloides*, *Phryganidia californica* and *Tithraustes haemon* (Dioptidæ), vein 5 is a distinct continuation of medial fold. The families almost intergrade, as the confusion in the genera in Kirby's catalogue bears witness.

The larvæ of the Dioptidæ (only known to me in Phryganidia) have single Noctuidous setæ. To derive the Pericopidæ from them, we must suppose an independent wart formation analogous to that of the Apatelidæ from the Noctuidæ or the Eupterotidæ from the Notodontidæ, but simpler than either.

Now as confirmatory evidence, we have in the moths the marked similarity in build and pattern of coloration; also a tendency in both families to the coalescence of veins 3 and 4, not seen in the Noctuidæ and Arctiidæ. The Noctuid habitus of the larva is also equally consonant with an origin from the generalized Noctuiform Dioptid larva as from any existing type of the Noctuidæ.

I think that we may conclude, therefore, that the Pericopidæ are a family representing a specialized form of Dioptidæ, with independent moving of vein 5 toward 4 and wart formation in the larvae. Their geographical distribution is also in favor of this conclusion, since, being confined to America, their origin from the strictly American Dioptidæ is more reasonable than from either of the world wide Noctuidæ or Arctiidæ.

Finally a word concerning the origin of the Dioptidæ to trace the ancestry a step further. In this Journal (Vol. iii, p. 30–32), Dr. Packard argues for the derivation from a common ancestor of the "Geometrids, Dioptids, Hypsids and Syntomids"=Euchromiidæ. It is true he makes this ancestor to be the Lithosiidæ, why I am unable to imagine. We have no evidence of the extensive degeneration which is implied in deriving the simple Geometrids and Hypsids (a low Noctuidous type) from the highly specialized Lithosiidæ, with their four-branched cubitus and modified wart formation in the larvæ. To my mind, the present group nearest to the ancestral form of the Noctuina (which includes the four families mentioned by Dr. Packard) is the Notodontidæ.* We see in them a combination of the generalized position of vien 5 with the single haired tubercle of the larva. The two families next nearest this stem are the Dioptidæ on one side and the Geometridæ on the other. Therefore I agree with Dr. Packard's main proposition, and we may derive the Dioptidæ from low on the main stem of the Noctuina, near the ancestors of the Geometrids, as illustrated in the genealogical tree shown on the accompanying plate (Plate III, fig. 9).

COMPOSIA FIDELISSIMA: ITS LIFE HISTORY.

1866—Herrich-Schäffer, Cor. Blatt. Reg. XX, 131.
1867—Grote, Proc. Ent. Soc. Phil. VI, 303.
1890—Dyar, Ent. News, I, 105.
1891—Dyar, Ent. News, II, 50.
1892—Kirby, Cat. Lep. Het. I, 190.
1894—Neumoegen & Dyar, Journ. N. Y. Ent. Soc. II, 26.

Composia olympia BUTLER.

1871—Butler, Ann. Nat. Hist. (4) VIII, 290.
1884—Druce, Biol. Cent. Am. pl. 11, fig. 1.
1890—French, Ent. News, I, 153, fig.

Eggs.—Large, spherical, except for the flattened base; deep ocher yellow, slightly shining. Diameter 1.3 mm.; height .9 mm. The reticulations are small, rounded hexagonal, visible under a half inch objective. (Plate III, fig. 1). Twenty-four eggs were found on the back of a single leaf, irregularly distributed and rather remote from each other.

Stage I.—Head rounded, shining, concolorous with the body; width .5 mm. Body dull orange, segments 5–6, 9–11 reddish purple;

* In some characters the Dioptidæ themselves are more generalized than the Notodontidæ, e. g., the presence of traces of a third anal vein in hind wings as shown by Prof. Comstock; but on the whole they must rank a little higher.

warts dusky, those on the purple segments blue-black; thoracic feet and leg plates black; hair black, strong and stiff, singly from the warts, spinulated and pointed. The arrangement of the tubercles is normal for the primitive first stage of the Noctuina. (Plate III, fig. 2).

Stage II.—Head .8 mm. Warts many haired, the hairs black except a pair of long white ones which overhang the head, arising from the upper wart on joint 3. The warts have a central hair and radiating crown of secondary hairs except iv, which is single haired. Wart vi present, large. On the thorax there are two warts above the stigmatal wart closely approximated. The coloration is as before.

Stage III.—Head 1.1 mm. The dark segments of the body are mottled by the general orange tint; otherwise as before. This differs from the next stage in being more decidedly orange, the blackish shadings more livid.

Stage IV.—Head 1.6 mm. Like the mature larva.

Stage V.—Head 2.2 mm. No change except in size.

Stage VI.—Head 2.8 mm. From the width of the head this is an interpolated stage, but it was persistently passed through by all the larvæ observed at first. Later some examples of a brood omitted it and in these the width of head in Stage V was about 2.5 mm.

Stage VII.—General appearance beautiful bright crimson and shining violet blue, sparsely hairy. Head and body crimson red, not shining; warts shining red, certain of them shining violet-blue, the areas around these warts discolored, blackish. Spiracles pale orange. On joints 2 to 4, only the two lowest warts bluish; on 5, 6, 9, 10 and 11 all the warts blue, the blackish shades predominating subdorsally; on joints 7, 8 and 12 warts iv to vi bluish. This distribution of color is subject to some variation. Hairs sparse, only 8–10 to a wart, stiff, barbuled, rather short, black; from wart i on joint 3 and from i on joint 13 a single stiff white hair, four times as long as any other, projects forward and back, probably serving as a tactile organ. In many instances one or both of the posterior hairs are missing. Warts i to vi and leg-plate normal, iv rather small; on joint 3, i and iia nearly fused but separable, more remote on 4; ii*b* rudimentary, a single hair; iii a single hair; iv + v and vi normal warts; on joint 2, hairs from the anterior and posterior edges of cervical shield, a wart before the spiracle and a subventral wart. Head setæ simple (Plate III, fig. 4); width 3.2—3.4 mm. The mature larva is figured on the plate (fig. 3).

Cocoon.—This can scarcely be called such. It consists of a few threads which serve to entangle the hooks on the head and cremaster.

Pupa.—(Plate III, fig. 5). Cases large, compacted, a large prominent knob at the base of the wing case; abdomen small, conically tapering, but enlarged on the dorsal side toward the base; three moveable incisures. The lines of the wing veins and the abdominal segments are marked by punctures. Corresponding to the position of the larval warts and to the legs are a series of tufts of flattened straw-colored scales. Two pairs of hooks on the head (Plate III, fig. 8), and many strong ones on the cremaster (Plate III, fig. 7). The color is a rich mahogany red with blue and violet shadings especially on the wing cases. Length 20, width 7 mm.

Food Plant.—The leaves of *Echites umbellata.* Kindly determined by Mr. F. Kinzel, to whom I am also indebted for a supply of the plant. In confinement the larvæ will also eat oleander, but did not occur on this plant in nature. Mrs. Slosson informs me that she has found the larvæ on *Canavalia obtusa.*

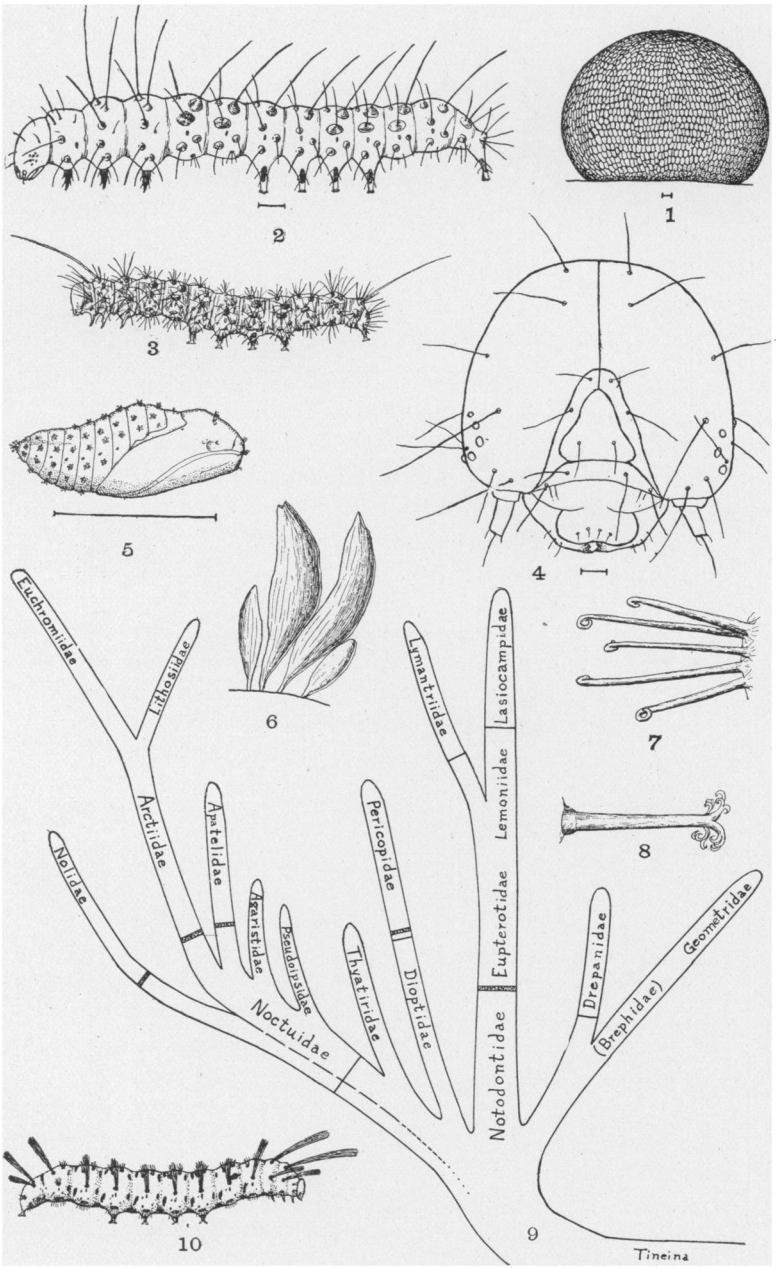
Habitat.—This species reaches us from Brazil, being found also in Central America and the West Indies. It is abundant in Key West, as I learn from Mr. Brownell, and its northernmost record is on the strip of land between Indian River and the sea. Eggs, larvæ in all stages and moths were found at the same time, and the species doubtless breeds continuously.

THE LARVA OF SYNTOMEIDA EPILAIS *Walk.*

BY HARRISON G. DYAR.

This larva was met with on the oleander at Palm Beach, Florida, in January, 1890, and again in the same place in 1896. Its life history will be found described in the second volume of "Insect Life," page 360, and the object of the present note is to call attention to the figure on the plate (Plate III, fig. 10).

The hair tufting of this larva is decidedly unusual. All the hair tufts are gathered into slender pencils, not spreading tufts as usual, so that here the body is entirely exposed to view. Some of these hair pencils are long, others very short and warts iv and v are much reduced, nearly obsolete.



Larvæ of Composia fidelissima and Syntomeida epilais.